THE OPERATIONS FOR NEOPLASMS OF THE TONGUE.*

BY JOHN ROGERS, M.D.,
OF NEW YORK,
Surgeon to Gouverneur and to St. Francis' Hospitals.

A BRIEF historical review of the different typical operations and a short description of each will aid greatly in the selection of a method which may be suitable for any given case. Although "cutting off the tongue" was a favorite punishment which in ancient times seems not to have been attended by any great degree of mortality, operators were very slow to take the hint it gave, and the fear of hæmorrhage retarded the progress of the surgery of this organ until only about twenty or thirty years ago. The ecraseur or some similar plan of constriction was for a long time the favorite means of attack in all instances demanding interference, and even now there are conceivable circumstances in which this method might be justifiable, as in certain angeiomatous conditions. Hence on this account, as well as for historical completeness, the means at our disposal for compressing the base of the tongue should be at least mentioned.

The avenues of approach for removing the whole or a portion of the organ may be classified as through (1) the mouth; (2) the jaw; or (3) the neck. There are occasional references to extirpation of new growths in the tongue through the mouth during the XVII and XVIII centuries, and Marchetti of Padua in 1664 was apparently the first to thus remove a carcinoma.[42] Inglis, in 1805, in a case of tumor on the border of the tongue, passed several ligatures through the tissues surrounding it, and by tightening them caused the tumor to slough out and thus obtained a cure in the course of three or four weeks. The elastic ligature seems to have been used about 1850, and Langenbuch[21] in 1878 advised the application of this principle as a preliminary to the removal of certain angeiomata. After drawing the tongue well out and, if necessary, dislocating the jaw forward, a large curved needle carrying a stout silk ligature is entered as far back as possible in the dorsum just to one side of the median line. This passes through the tongue substance, under the lingual vessels, enters the mouth between the jaw and the tongue and again penetrates the edge of the tongue. Another ligature is similarly passed through the opposite side, overlapping the first in such a way that when both ligatures are tied all the vessels and the whole substance of the tongue except its edges are constricted. (Fig. 1.) The disease is then removed with knife or cautery.

---

* Read before the New York Surgical Society, January 9, 1907.

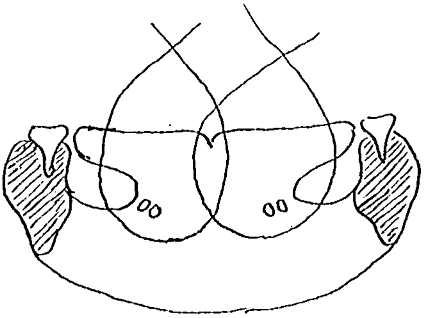

FIG. 1.—Langenbeck's method of constricting the tongue by sutures passed through its substance.

The chain, or wire, ecraseur introduced by Chassaignac in 1854, as stated previously, was once quite extensively used and was passed around or through the tongue and sometimes several were applied simultaneously. Middledorpf, about 1860, was thought to have slightly improved the instrument by making of it a galvano-cautery; but the hæmorrhage, both primary and secondary, which it was principally designed to control, occurred frequently enough to cause its eventual abandonment. In the elaboration of preventive hæmostasis Cloquet, in 1827, was probably the first to surround the base of the tongue by a ligature entered through the neck. He introduced a needle carrying a stout suture in the middle line just below the hyoid bone, and brought it out in the pharynx between the tongue and angle of the jaw. It was similarly passed on the other side and the ligature was drawn tightly and knotted on the surface of the neck. Arnott, in 1838, made the procedure more exact by a preliminary vertical incision through the skin and mylohyoid muscle, and Nuneley,[31] in 1861, gained some reputation by employing this route for applying Chassaignac's ecraseur. To prevent the ligature, wire, or chain from slipping forward, knitting needles have been passed through the tongue back of the growth while the mouth is widely distended, or as Barwell,[2] in 1879, suggested, long steel needles have been similarly passed up from below through the opening made for the ecraseur above the hyoid. Fiorani,[15] in 1882, pushed a trochar and cannula from a slit in the skin just above the hyoid bone into the pharynx far back between the tongue and tonsil, first on one side and then on the other and after withdrawing the trochar introduced a silk ligature. The intraoral ends were then drawn out of the mouth and knotted and then slipped back after withdrawing the cannula. And by attaching a stout rubber band to one cervical end of the ligature an elastic tourniquet was thus dragged in and made to surround the vessels at the base of the tongue and tightened by a clamp under the chin.

The credit for recommending preliminary ligation of the lingual artery through the neck above the hyoid bone has been ascribed to Mirault,[20] in 1833, or to Roser [34] or Roux [35] in 1839; and Maissoneuve [27] was probably the first to extend this in urging the preliminary exposure and ligation of the external or even the common carotid for extensive operations. It is interesting to note that this procedure about the same time was much advocated for purposes of starving out the growth, and there is occasional mention before 1860 of its usefulness for removing secondary enlarged cervical glands.

Although there are several earlier instances of excision of lingual neoplasms with the cautery, C. J. M. Langenbeck,[22] in 1819, seems to have been the first to record the clean removal of a tumor of the tongue through the mouth by a V-shaped incision around it and immediate suture of the resulting wound. This method was afterwards practised and recommended by Dieffenbach,[13] who as a preliminary to the incisions, inserted sutures to insure immediate coaptation of the cut surfaces and so obtain hæmostasis. Excision with the knife or scissors was thus in use long before the operation was popularized under the name of its more recent advocate Whitehead,[11] who proceeds as follows: The patient is anæsthetized in a sitting position in a " rocking " chair; the mouth is held widely open with a suitable gag, and the tongue drawn out by a stout ligature passed through its tip. Using only scissors curved on the flat, the frenum is cut and then the mucous membrane along the base of the tongue on one or both sides according to the amount of the organ to be removed. If the diseased portion is not then sufficiently accessible, one or both anterior pillars of the fauces with the underlying styloglossus muscles are divided. If only half the tongue is to be removed it is then split in the median line and cut across about three-quarters of an inch behind the disease. If the whole tongue is to be excised a ligature is first passed through its substance in front of the glossoepiglottic fold (to prevent the stump slipping back out of sight) and the section made anterior to this point.

Originally he recommended that the vessels be seized and twisted as they were cut, and no ligatures seem to have been applied; but later he advised that after section of the mucous membrane at the side of the tongue, the vessels should be isolated by blunt dissection and seized with forceps before cutting. He has always strenuously objected to division of the jaw and to preliminary tracheotomy, and for the latter deserves great credit. Apparently he only removed the cervical glands when they were palpable, and generally at a later operation.

Jacobson [18] uses this method whenever it is possible thus to make the section one inch beyond all disease, and he removes the glands first, if it is necessary to perform the operation in two stages. When only one half of the tongue has to be excised he passes a ligature through each side of the tip and splits it down the middle and then cuts the mucous membrane along the floor of the mouth on the diseased side, the corresponding anterior pillar of the fauces and the thick mucous membrane on the sides and dorsum of the tongue an inch back of the tumor. After these steps the vessels are isolated in the soft muscular tissue by blunt dissection and seized and ligated before completing the section. Cathcart [6] has improved upon this method of hæmostasis as follows: A traction ligature is passed through each half of the tip of the tongue; the mucous membrane is then split mesially with straight, blunt-pointed scissors throughout the whole length of the dorsum, and under the tip into the frenum and along the base of the tongue on the diseased side between the tongue and jaw. The geniohyoglossus muscle on the affected side is then defined and its attachment to the symphisis cut, allowing the corresponding half of the tongue to be still more drawn out. The anterior border of the hyoglossus on this side is defined by a director which is passed beneath it, and on this the anterior two-thirds

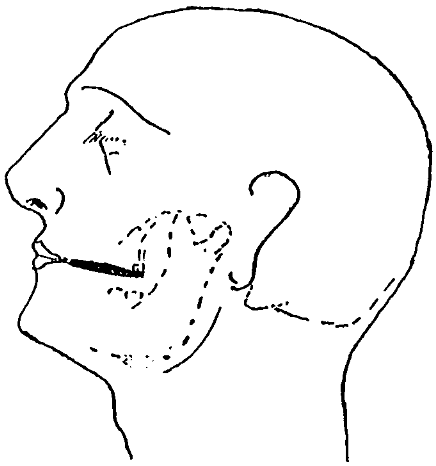

FIG. 2.—Jaeger's method by splitting the cheek.

of the muscle is cut transversely, exposing the artery pulsating at the bottom of the wound, where it is seized and tied and the diseased half of the tongue excised.

In 1832 M. Jaeger[10] (Fig. 2), to gain better access to the back of the tongue, advised splitting one cheek outward to the anterior border of the masseter muscle on a line drawn from the angle of the mouth to the base of the mastoid process. This avoids the parotid duct and generally all important branches of the facial nerve. Maissoneuve[27] in 1852 carried out this plan on both sides of the face, and though it has occasionally been employed since then the gain in space is not enough to make the method often useful.

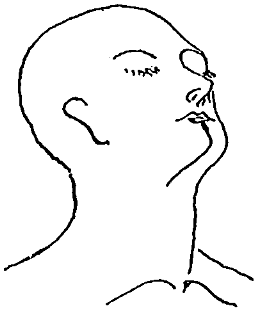

FIG. 3.—Sedillot's incision.

As the operations through the mouth should always be accompanied by removal of the cervical lymphatics some mention should be made here of the possible methods for exposing these structures. Their removal in one mass with the attached fat and fascia from the sternum to the base of the skull together with the submaxillary and sublingual salivary glands, as these constantly contain lymphatics connected with the rest of the system, is theoretically best for permanent cures but not best for all individuals. More surgeons will agree to a complete removal of all dangerous tissue on one side than on both sides, and it may only be necessary to remove the lymphatics and the submaxillary and sublingual glands between the jaw, hyoid bone, and mastoid process. For exposing these there are the usual straight incisions along the anterior border of the sternomastoid muscle, with liberating ones passing to the chin at a right angle, or the disfiguring S-shaped incision formerly suggested by Hartley[16] or that of Stieda[38] following the lower border of the jaw, or the H-shaped incision of Eisendrath.[14] If the operation has to be done in two stages it seems generally wiser to remove the primary disease in the first sitting and the lymphatics in the second.

The first recorded section of the jaw for removal of the tongue seems to have been performed by Roux in 1836,[35] who divided the lower lip vertically in the median line and the underlying symphisis. This operation generally goes under the name of Sedillot's, who apparently without knowing of his predecessor or at least without referring to him, in 1844 did practically the same thing making a > shaped section at the symphisis. In England the operation was known as Syme's,[39] as he introduced the method in 1856 also without reference to previous surgeons, but employed a vertical section at the symphisis with an incision extending in the middle line through the edge of the lip to the hyoid bone. This operation at first was attended by a very high immediate and secondary mortality, both on account of the extent of the disease requiring the

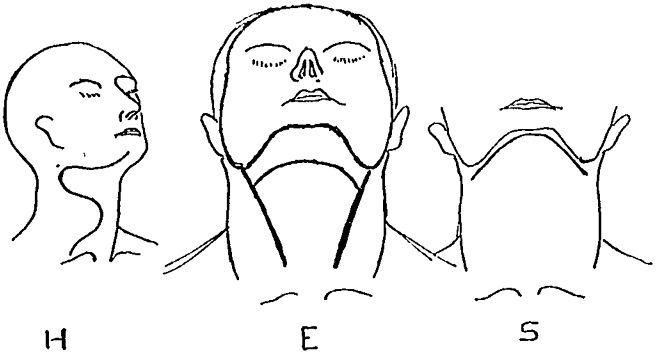

FIG. 4.—Incisions for removing lymphatics.
H. Hartley. *E.* Eisendrath. *S.* Stieda.

procedure and the subsequent difficulty in deglutition. Langenbeck (Fig. 5) in 1875, improved on this method by dividing the jaw on the diseased side just in front of the last molar tooth from behind forward and from within outward, after first boring holes in the jaw on each side of the proposed line of section. The skin incision extends in a straight or slightly curved line from the angle of the mouth to the sternomastoid muscle at the level of the thyroid cartilage; and the dissection begins from below. The lymphatics and submaxillary gland are removed, the digastric and stylohyoid muscles and generally the hypoglossal nerve are cut, and in the original method the lingual artery is tied, although a preliminary ligation temporary or permanent, of the external carotid makes the operation shorter and so safer. After cutting the jaw the tongue is drawn out through the wound by a ligature in its tip and as much as need be excised together with one or both

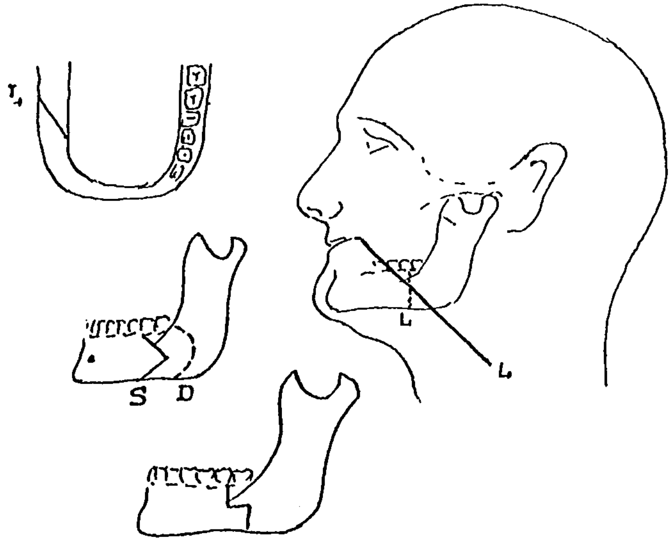

FIG. 5.—Langenbeck's operation (*L*, *L*, *L*). Sedillot's method of cutting the jaw (*S*). Downes' method of cutting the jaw (*D*).

lingual nerves. The raw surface within the mouth is then closed by sutures as far as possible and the jaw is united by wires or silk sutures passed through the holes bored before it was divided. A partial suture of the external wound, with drainage in its lower angle extending into the mouth, follows. Of all the methods this probably gives the freest and most satisfactory access to extensive disease or that located in the posterior portion of the mouth; but it of course results in paralysis of half of the lower lip, and to avoid this Crespi and Bastianelli[3] (Fig. 6) in 1890 made an angular shaped ┘ incision vertically through the middle of the lower lip, then along the inferior border of the jaw to the sternomastoid and down that over the great vessels as far as need be. The skin and soft parts are raised to about 2 cm. in front of the masseter, exposing nearly all of the lower jaw, which is sawed through as in the original Langenbeck operation, in front of the last molar tooth or at any desirable point.

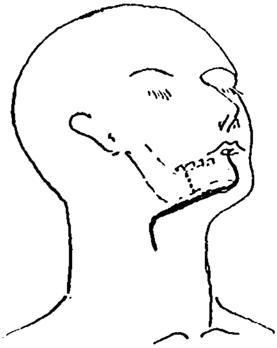

Fig. 6.—Bastianelli's incision.

Kuster,[21] in 1885, combined Langenbeck's skin incision with Mikulicz's method of pharyngotomy, by excision of the ascending ramus of the jaw, and in instances where the disease involves this part of the bone or the attached soft parts it presents advantages. The original Mikulicz pharyngotomy (Fig. 7) was undertaken for removing a cancer of the tonsil, and also gives moderately free access to the glosso-epiglottic region of one side. The incision extends from the base of the mastoid process downward for about three inches along the anterior border of the sternomastoid muscle. Through this the soft parts are raised from the inner and outer surface of the ascending ramus of the jaw with a periosteal elevator, the mouth entered opposite the last molar tooth and the bone sawed through at the angle. The upper anterior portion of the wound with the overlying parotid gland is drawn forward and the ramus backward, while the insertion of the temporal muscle is separated with the knife, or the coronoid process is cut through at its base with forceps. Then the ramus, aided by a few snips with scissors, is twisted or torn out of the joint. Aided by a finger or urethral sound in the pharynx, the latter is opened after dividing the digastric and stylohyoid muscles in front of the carotids, and above the superior laryngeal nerve, which should be spared.

Minor modifications can be made of Bastianelli's [3] incision, such as prolonging the wound in the lips to and along the hyoid bone, for the removal of secondary deposits, or placing it on one or the other side of the mental foramen to adapt the flaps so as to expose any secondary or extensive growth and preserve as much as possible of the motor and sensory nerve supply of the face. Czerny [11] has thus combined Jaeger's and Langenbeck's methods by splitting the angle of the mouth backward to the masseter muscle and then carrying the incision vertically downward through the soft parts and the bone to the thyroid cartilage, but only in exceptional instances would such an opening be necessary. In another case median division of the lower lips and chin, with a prolongation of the incision, as in Kocher's operation, was accompanied by removal with the lingual disease of the entire corresponding half of the lower jaw. Rose [38] in 1900 thus successfully removed the tongue and all the soft parts in the floor of the mouth down to the hyoid bone, and the entire lower jaw with the exception of one ramus and enough of the attached body to permit the retention of the corresponding two posterior molar teeth. The patient a year afterwards was in good condition and showed no recurrence. Also Kocher in 1890 combined in one case his usual incision with a prolongation downwards along the sternomastoid and section of the jaw at the angle.

The only osteoplastic method which has been recommended is known as Billroth's (Fig. 7) and was described in 1862. A vertical incision is made from each angle of the mouth to below the lower border of the jaw, which is then sawn through on these lines and the chin with the attached soft parts then displaced downward. After removal of the disease the bone is replaced and held in position by sutures.

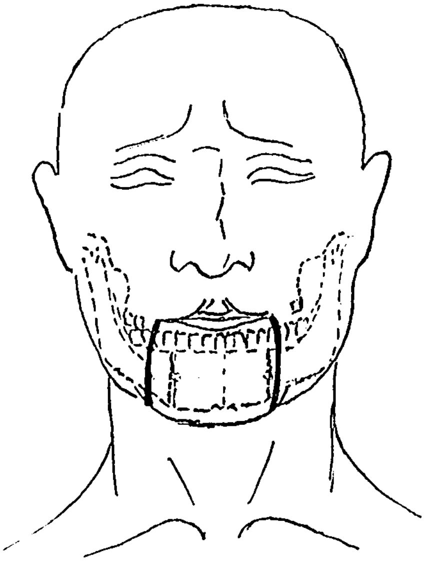

FIG. 7.—Billroth's osteoplastic method.

The manner in which the jaw is cut and afterwards united is of considerable importance. In the earlier methods a straight transverse, a < shaped or ‾|_ angular division was made with the saw directed in different planes for each angle with the object of avoiding displacement, but the geometrical law that the intersection of all plane surfaces is a straight line prevails and displacement cannot thus be escaped. In division near the angle the posterior segment, under the influence of the pterygoid muscles tends to be drawn inward and division from behind forward and within outward, thus making the posterior overlap the anterior segment, is best. In this region also a C shaped (as suggested by Dr. Downes of this city) or < shaped section helps to minimize the tendency to upward and downward variation. But with any saw, and especially the Gigli wire instrument, there is considerable loss of tissue which increases the difficulties of adjustment; possibly the use of giant bone forceps, as suggested by one of the English surgeons, would leave the closest-fitting joint. In reuniting the segments the preference is generally given to silver wire sutures passed through holes bored on each side of the line of section before the latter has been completed. It is very difficult to bore them afterwards. And two sutures assure better retention than one. Petersen,[32] in 1887, advised fastening the segments (sawn so as to overlap) with silver nails driven through the cheek, though in old people, owing to the danger of fracture, holes should previously be drilled. Dr. K. C. Gibson, the dentist who has had the most experience with interdental

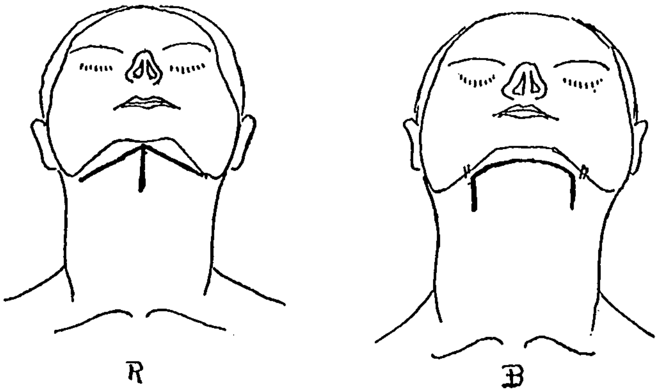

FIG. 8.—*R*, Regnoli's operation. *B*, Billroth's modification.

splints, informs me that he advises against such appliances in these cases on account of the difficulty of maintaining cleanliness; but in cases requiring more or less extensive removal of the jaw some prosthetic apparatus should be worn for about a couple of weeks to prevent bad displacement of the remaining segments.

The earliest of the operations upon the tongue by the route below the jaw or through the neck is known as Regnoli's [86] (Fig. 8, R) (published in 1838) whose ⩚ shaped incision began opposite the symphisis and followed the lower border of the jaw to the angles and was supplemented by a median division of this flap. Billroth (Fig. 8, B) in 1874 modified this by an incision of 3 to 4 cm. following the lower border of the jaw, with its centre opposite the symphisis and its extremities just avoiding the facial arteries. From each end of this, straight liberating incisions were carried backward and downward to the greater cornua of the hyoid bone. After division of the attachments of the digastric and mylohyoid muscles, the inner surface of the concavity of the jaw and the genial tubercles were freed of soft parts by the periosteal elevator, the floor of the mouth entered and the tongue drawn out on the neck and as much as need be excised. Owing to the complete division chiefly of the geniohyoid and geniohyoglossus muscles the subsequent difficulties in degultition and breathing seem to have been considerable and were apparently the principal factors in the high mortality of 25 or 30 per cent. in this operation.

Czerny (Fig. 9, Z) in 1870 was apparently the first to advise the lateral inframaxillary route. His incision extended from the symphisis to the middle of the hyoid bone and then along its upper border to the edge of the sternomastoid muscle. Through this opening the lingual artery was tied in its triangle, the skin and platysma were dissected up to the jaw from the inner surface of which the periosteum and attached soft parts were raised by a periosteal elevator, from the angle to the symphisis, until the mucous membrane was reached and divided close to the teeth. Then the anterior attachments of the geniohyoid and geniohyoglossus were severed and the tongue drawn out on the neck. At the same time with the primary disease the sublingual and submaxillary salivary and lymphatic glands of one side could thus be removed. Kocher's operation (Fig. 8, K), published in 1880, differed from this slightly in the external incision which extended along the anterior belly of the digastric from the symphisis to the hyoid, following its upper border to the sternomastoid and then upward to a point opposite the mastoid process. The flap was raised, exposing the muscles; the sublingual and sublingual glands were then excised, the vessels tied in the lingual triangle, the mylohyoid cut close to the jaw and the tongue drawn below out of the wound, without interfering with the muscular attachments to the genial tubercles. After free excision of the disease the wound was partially closed and packed. The chief feature of the procedure was, however, the preliminary tracheotomy and tamponade of the pharynx and trachea to prevent the septic pneumonia which was always the most frequent cause of death. He thus presented a series of cases with a 7 per cent. mortality instead of the usual 20 or 30 per cent.,

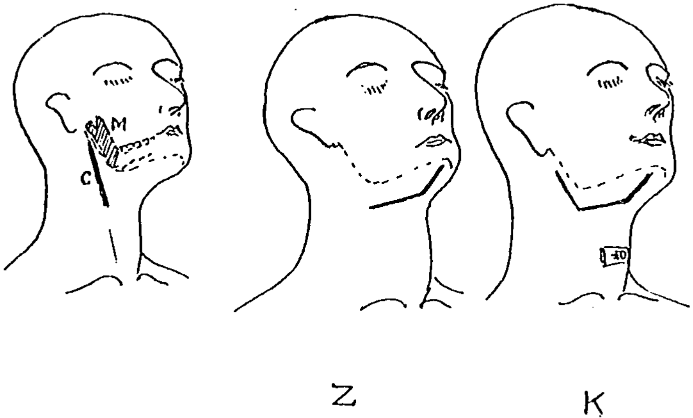

FIG. 9.—*C*, *M*, Mikulicz method of pharyngotomy with excision of ascending ramus of jaw. *C*, Cheever's incision for pharyngotomy. *Z*, Czerny's inframaxillary operation. *K*, Kocher's operation with preliminary tracheotomy.

which had been the experience of others, and his methods thereafter were widely adopted.

Cheever's lateral pharyngotomy (Fig. 9, C) introduced in 1869, does not give as free access to the back and base of the tongue as Mikulicz's operation, but it is less mutilating and might occasionally be useful. A three or four inch incision is carried downward from the base of the mastoid process along the anterior border of the sternomastoid and through this, after division of the digastric and stylohyoid muscles, the pharnyx is entered in front of the vessels and above the superior laryngeal nerve.

Subhyoid pharyngotomy by transverse division of all soft parts in this situation could not be as useful as the corresponding suprahyoid operation and neither operation gives as satisfactory access to the rare benign growths of the base of the tongue, for which alone such an approach is justifiable, as Vallas[40] transhyoid pharyngotomy described in 1900. In this an incision is carried from the symphisis to the pomum Adami, the hyoid cut in the centre with bone forceps and the wound deepened, if necessary, through or to one side of the epiglottis until the pharynx is opened; or previous to the section of the hyoid, Kocher's flaps are raised on one or both sides and, after ligation of the vessels in the lingual triangle and extirpation of the glands, these lateral incisions are closed, the bone cut and the pharynx then opened and the primary disease in the tongue thus exposed and removed.

It has generally been customary to close by suture all the raw surface possible which may be exposed within the mouth and Lane,[25] in 1892, advised the formation of flaps of the remaining sound mucous membrane to facilitate this, and the turning of the tip of the tongue if present, around into any lateral gap.

As a palliative operation for the relief of pain Hilton,[17] in 1850, was the first to introduce section of the gustatory nerve in the floor of the mouth betwen the tongue and second molar tooth. By knicking the mucous membrane and a little blunt dissection, it can be found here just behind the sublingual gland; or, better, after the method of Moore;[30] the tip of the tongue is drawn well out of the mouth toward the opposite side and the nerve cut just below the mucous membrane by a three-fourths-of-an-inch incision on the line passing from the crown of the last molar tooth to the angle of the jaw. The edge of a sickle-shaped knife, to reach under the mylohyoid ridge, is directed toward the bone.

In all these different methods, and at all times pneumonia, shock, hæmorrhage and sepsis, about in this order, seem to have been the most frequent cause of an immediate mortality which has gradually decreased from between 30 and 40 per cent. to between 5 and 15 per cent., depending upon the extent and duration of the disease and the severity of the operation necessary for its removal. Death from the recurrence of cancer has generally been produced by its growth in neighboring lymphatics, or diffusely in the wound made for the original removal of the disease, less often in the stump of the tongue and rarely from metastases in distant organs. The percentage of permanent cures has varied in different statistics from 10 per cent. to 30 or 40 per cent., and seems on the average to be nearer the former than the latter figures. But so many factors have to be considered that one can only say there are enough chances of success to make all but the clearly hopeless cases worthy of trial.

As regards the mortality following the different operations the statistics are naturally greatly in favor of those I have described as Whitehead's, coupled with thorough removal of the cervical glands. And it is decidedly worthy of note that in these cases usually only a portion and not the whole tongue has been removed. This implies, of course, that patients treated by excision of the disease through the mouth must usually have presented themselves at an early stage, but it by no means covers all such operations performed by the English surgeons, who seem seldom to use any other method and whose results compare very favorably with the commonly more drastic and mutilating procedures of the Germans. When, therefore, the line of excision can be made at least three-quarters of an inch wide of the growth, through sound tissues by Whitehead's method, experience has apparently proved it the best both for immediate and late mortality. Jaeger's plan of splitting the cheek outward, as remarked previously, increases only to a slight degree the amount of space offered by the natural opening, and as it adds an unsightly cicatrix and some risk of auto-innoculation of the wound and more or less facial paralysis, it is not to be generally recommended, although for some unusual case it might be of service and so should not be forgotten.

Before passing from the operations through the mouth to those which can only be carried out by other methods, some reference should be made to the amount of the tongue which it is necessary to remove for malignant disease and the advisability of excising the latter where there is a considerable or deep involvement of the anterior part of the floor of the mouth. It seems to be the general practice in Whitehead's, as in other operations, even when the disease involves only a portion of the lateral border, to begin at the tip of the tongue and cut through the middle line to a point about three-quarters of an inch behind the growth, and this is also done when the tumor is well back of the anterior extremity of the organ. I can find no good anatomical reason for this, as the lymphatics do not run forward but downward or backward, and although the exact line of section is not generally described, the results, as regards local recurrence, appear to be equally as good when the lateral disease is excised by a simple V widely around the sides of the neoplasm as when the whole of the organ is removed. Hence, as the tip of the tongue is very necessary for speech and for mastication, it should be spared whenever it is not within at least half an inch of the new growth, or it may be partially turned back for plastic closure of a large lateral defect.

The advisability of operating upon a cancer which involves the anterior attachments of both geniohyoid and geniohyoglossus muscles needs much consideration. Pneumonia is and has been the most frequent cause of death in all operations upon the tongue, and while formerly the aspiration of blood was thought to be the chief etiological factor, it has of late been generally conceded that interference with deglutition is far more important in this respect, and that while exhaustion from shock and hæmorrhage can predispose to this dangerous intercurrent affection, any additional burden upon the act of swallowing makes the chances of an attack of pneumonia greater. The fatalities due to this disease caused the abandonment of Billroth's osteoplastic method of resection of the anterior segment of the jaw and finally of his and Regnoli's submental operations and the general adoption of the lateral operations, or of Whitehead's (all of which usually leave intact at least one geniohyoid and part of one geniohyoglossus muscle), has been followed by a great improvement in the pneumonia mortality. Hence it is apparent that operations which involve separation of all the muscular attachments from the genial tubercles present a grave prognosis, and the subsequent difficulties dependent upon breathing and swallowing may be so great as to seriously raise the question whether or not such a procedure is justifiable. Personally I believe that it is seldom proper.

For cases in which the disease is located far back in the mouth or in which one or other pillar of the fauces or the tonsil or pharynx is involved, Langenbeck's operation, or more rarely Sedillot's, is the one of choice. These methods not only leave undisturbed the muscular attachments to one or both genial tubercles but they both, especially Langenbeck's, provide very free access for operations in the oral cavity, and at the same time expose the cervical glands and the great vessels. It has been my experience that not only is preliminary ligation of the external carotid simpler and therefore more quickly carried out than ligation of the lingual but it is equally safe and far more effective in facilitating all the steps in the rather extensive interference in these more difficult cases. The operations through the neck, such as Billroth advocated, have practically been abandoned for the reasons stated above, and Kocher's lateral inframaxillary route with its attendant preliminary tracheotomy, once so popular, is now seldom practised—and for several reasons, one of which at least I have not observed to be noted in the literature as a valid objection. This is the liability to recurrence of the cancerous elements diffusely in the line of the cicatrix. Kocher's incision provides so little space that the force necessary to drag the tongue down within reach through the cervical opening involves considerable risk of auto-inoculation of the wound, if the epithelioma, as is usual, is an open ulcer. And in former days, when the operation was more frequently employed than at present, I have several times observed this occurrence. Auto-infection of a fresh wound with malignant disease is an ever present possibility in all operations, especially in those upon the head and neck, and ought to be more emphasized than it is.

The frequently fatal pneumonia which was and often now is attributed to the aspiration of blood into the lungs, must be ascribed chiefly to difficulties in deglutition, though hæmorrhage with its attendant shock and prostration is undoubtedly a contributory factor. Hence preliminary tracheotomy with the attendant tamponade of the trachea and pharynx, should generally be avoided as it contributes only its own additional dangers and increases the patient's difficulty in swallowing, and general discomfort. A thorough preliminary hæmostasis by permanent or temporary occlusion of the external or even the common carotid, as Crile advises, is far more rational. If, however, there is dread of foreign matter entering the larynx during the operation, an O'Dwyer laryngeal catheter or Crile's rubber tube instrument is an efficient substitute for the more dangerous tracheal cannula.

In conclusion a word should be said about the after-treatment, or rather the preparatory treatment, of these patients whose nutrition is apt to be so badly impaired; many of them, especially if the jaw has had to be divided, have great difficulty in taking nourishment, and feeding by a stomach tube during the first week of convalescence is absolutely essential. If before the operation is undertaken the individual for a few days is habituated to lavage and goes through a course of mouth and tooth cleansing, the subsequent chances of safety and comfort are greatly increased.

REFERENCES.

[1] Arnott. Lancet, 1838-39, i, p. 310.
[2] Barwell. Lancet, 1879, i, p. 549.
[3] Bastianelli. Centrl. f. Chir., 1890, xvii, p. 556.
[4] Billroth's Submental Op. Archiv f. klin. Chir., 1874, xvi, p. 1.
[5] Billroth's Osteoplastic Op. Archiv f. klin. Chir., 1862, ii, 651.
[6] Cathcart. ANNALS OF SURGERY, 1902, xxxvi, p. 15.
[7] Chassaignac. Traité de l'Ecrasement.
[8] Cheever. Bost. Med. and Surg. Journ., 1869, lxxv, p. 54.
[9] Cloquet. (See Woelfler.)
[10] Crile. ANNALS OF SURGERY, 1906, xliv, 842.
[11] Czerny. Med. Chir. Rundschau, Wien, 1870, xi, pt. 4, p. 65.
[12] Czerny's Atypical Ops. Beitrag. z. klin. Chir., 1901, xxxi, 389.
[13] Dieffenbach. Chir. Operationslehre.
[14] Eisendrath. Journ. Am. Med. Assoc., Sep. 29, 1906, 986.
[15] Fiorani. Centrl. f. Chir., 1882, ix, 750.
[16] Hartley. Stimson's Op. Surg., 3d Edition.
[17] Hilton. Lancet, 1850, ii, 219.
[18] Jacobson. Surgic. Operations, 1889; also Practitioner, June, 1903.
[19] Jaeger, M. Schweiz. Zeits. f. Nat. u. Heilk, Zurich, 1834, i, p. 84.
[20] Kocher. Deuts. Zeits. f. Chir., 1880, xiii, 134.
[21] Kuster. Deuts. med. Woch., Dec. 10, 1885, p. 859.
[22] Langenbeck, C. J. Bibliothek f. Chir. u. Augenheilk, bd. ii, hft. 3, p. 487 (not verified by author).
[23] v. Langenbeck. Verhandl. der Deuts. Gesellsch. f. Chir., 1875, iv. (p. 111).
[24] Langenbuch. Archiv f. klin. Chir., 1878, xxii, 72.
[25] Lane. Lancet, June 11, 1892, p. 1291.
[26] Marchetti. (See Woelfler.)
[27] Maissoneuve. Monit. d'Hop., Paris, 1854, ii, 313; Bull. Acad. de Med., Paris, 1852-3, xviii, 230; and Comp. Rend. de l'Acad. des Sciences, 1863, v. lxvii, p. 831.
[28] Mikulicz. Deuts. Med. Woch, 1886, xii, 157.
[29] Mirault. (See Woelfler.)
[30] Moore. Lancet, Dec. 7, 1861, ii, 549.
[31] Nuneley. Lancet, 1861, ii, 594.
[32] Petersen. Weinleichner. Centrl. f. Chir., 1887, xiv, 550.
[33] Rose. Deuts. Zeits. f. Chir., 1900, v. lvi, p. 224.
[34] Roser. (See Woelfler.)
[35] Roux. Dublin Med. Press, 1839, ii, 215.
[36] Regnoli. Raccoglitore. Fano, 1838, ii, 71; and Bull. delle Scienz-Med di Bologna, 1830 (latter not verified by author).
[37] Sedillot. Comp. Rend. des Séances de l'Acad. des Sciences, Paris, 1844, xviii, 302.
[38] Stieda. Archiv f. klin. Chir., 1901, v. lxiii, p. 613.
[39] Syme. Lancet, 1858, i, p. 46.
[40] Vallas. Rev. de Chir., 1900, xxi, 623.
[41] Whitehead. Practitioner, 1903, xvii, 585.
[42] Woelfler (Early History of Cancer of the Tongue.) Archiv f. klin. Chir., 1881, v. xxvi, p. 314.